



# Flash sales: how consumers' emotional responses to negative word-of-mouth affect diagnosticity and purchase intentions

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## Abstract

Using information–cognition–intention model and by comparing emotional and rational negative word-of-mouth (nWOM), this study considered nWOM's role in online flash sales by examining whether consumers would find nWOM diagnostic and lower purchase intentions during flash sales. Partial least squares analysis of 308 questionnaires (150 for emotional and 158 for rational nWOM) revealed that worry, skepticism, and optimism emotions resulting from reading nWOM played a more limited than those of gratitude. Perceived diagnosticity of rational nWOM dampened while emotional nWOM did not dampen purchase intentions. Hence, nWOM content influenced whether nWOM acted as a brake on purchase intentions.

**Keywords** Negative word-of-mouth · Perceived diagnosticity · Purchase intention · Flash sales · Emotion

## 1 Introduction

Negative word-of-mouth (nWOM) occurs when customers complain and inform others about their unsatisfactory experiences with a product, service, or corporation (Amatulli et al. 2020), as such during service failure (Salagrama et al. 2021). The objective of nWOM is to persuade others to shun a product or company (Chih et al. 2019; Shin and Larson 2020); thus, it has a strong negative effect on consumers' purchase intentions (Nam et al. 2020). However, despite word-of-mouth being a popular research area (Lee et al. 2022; Moliner-Velázquez et al. 2021) and the well-known negative potency of nWOM, which has been well researched (Verma and

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Dewani 2021), how nWOM is interpreted remains debatable. For example, studies have found that nWOM does not always negatively impact companies. Instead, it can increase consumers' awareness of the products of lesser-known firms (Berger et al. 2010). Regarding the context-sensitivity of nWOM, humorous nWOM may elicit either positive or negative responses depending on the review intention (McGraw et al. 2015). Researchers have argued that there is still "a lack of detailed insight into how one interprets online nWOM" (Azemi et al. 2020, p. 565). Thus, more research is needed to provide this insight, which we attempted to do in this study.

We considered the influence of nWOM in the context of online flash sales, such as flash sales on the JD platform, limited-time flash sales on Pinduoduo, Chinese singles days, and cyber Mondays on Amazon.com, which are extremely popular (Berezina et al. 2016; Hao and Huang 2023; Liu et al. 2021; Peng et al. 2019). A product is sold with a heavy discount for a limited time during a flash sale (Liu et al. 2021; Shi and Chen 2015; Vakeel et al. 2018), with the aim of generating anxiety among consumers and causing them to make rash purchase decisions so as not to miss the opportunity (Berezina et al. 2016).

Studies have considered flash sales on various platforms, such as e-commerce platforms (Liu et al. 2021), and in diverse industries, such as the hospitality (Berezina et al. 2016; Piccoli and Dev 2012) and luxury products (Chen et al. 2021b) industries. Researchers have considered flash sales mechanisms, such as the best timing for flash sales operators to reveal low inventory levels to maximize sales (Chen et al. 2021a) and pricing policy (Ferreira et al. 2018). Numerous studies have also explained flash sales from consumers' perspectives, considering whether they increase consumer-perceived value (Eisend 2013) and attract different types of consumers (Berezina et al. 2016; Vakeel et al. 2018; Zhang et al. 2018).

However, to the best of our knowledge, few extant studies have examined the role of nWOM in flash sales. Interestingly, although the aim of flash sales is to create a sense of urgency and encourage purchasing by giving the impression of short-term scarcity, nWOM may have the opposite effect and discourage purchasing. This raises question about the influence of nWOM during flash sales and whether it can undermine flash sales' ability to increase sales.

We employed the information–cognition–intention model (Wang and Chang 2013), drawn from the information processing theory and the stimulus-organism–response (S-O-R) model, as an overarching model for examining this issue. Past studies have illustrated that how information is processed influences consumers' choices and decisions (Huber and Seiser 2001). The information processing theory has shed light on how individuals interpret and use information when making decisions (Huber and Seiser 2001; Wang and Chang 2013). The S-O-R model, in a similar manner, explains how the external environment and informational cues (acting as the stimulus) affects behavior (the response) through the organism variables of individuals' cognitive systems (Mehrabian and Russell 1975).

We conducted this study from the perspective of consumers as nWOM readers, rather than the more frequently considered angle of consumers as nWOM complainants. We specifically considered whether, after reading nWOM during flash sales, the emotions (optimism, gratitude, worry, and skepticism) felt by consumers about the nWOM would affect their perceived cognitive and affective attitudes, the

diagnosticity of the nWOM, and consumers' ultimate purchase intentions. Since flash sales offer major discounts, we also considered whether discount satisfaction contributed to the perceived diagnosticity of nWOM and subsequent purchase intentions.

We hold that nWOM should not be viewed as monolithic, and that nWOM's effects differ according to its content. Although researchers have offered various nWOM classifications (Azemi et al. 2020; Bae 2020), there is no consensus among them. We suggest using an emotional–rational dichotomy classification (Kotler and Keller 2008) to compare the performance of emotional (strong in emotional content) and rational (weak in emotional content) nWOM for the above relationships.

This study augments the nWOM and flash sales literature by providing an understanding of how consumers interpret nWOM, which is thus far insufficiently understood (Azemi et al. 2020). Second, it addresses the issue of studies that have considered how negative emotions (e.g., regret and anger) contribute to nWOM generation (Chih et al. 2019) but largely failed to consider the type of emotions felt about the nWOM after viewing it. Third, it elucidates whether emotional and rational nWOM exert different negative potency (if any) effects during flash sales.

This paper is organized as follows. The next section reviews the literature and discusses the development of the hypotheses. Section 3 describes the research design. Section 4 provides the results of the data analysis which is followed by Sect. 5 that discusses the findings, theoretical and practical implications, research limitations, and future research directions.

## 2 Literature review and hypothesis development

### 2.1 Information–cognition–intention framework

According to the information processing theory and the S-O-R model, consumers process the information they received before making purchase (Wang and Chang 2013). The information processing theory (Huber and Seiser 2001) conceptualizes how individuals heed informational cues and environmental events, encode them, relate what they know to the information, and remember and recall the information when needed (Schunk 2000). Based on information as stimuli, individuals actively process and use information, and their choices and decisions are the outcomes of their information handling (Huber and Seiser 2001). Likewise, the S-O-R model argues that informational cues, acting as stimuli, affect an individual's cognitive systems (the organism) which then affect behavioral intentions (the reaction) (Mehrabian and Russell 1975).

Using the information processing theory and the S-O-R model, Wang and Chang (2013) developed an information–cognition–intention model, the first component of which (information) serves as the input for consumers. The second component (cognition) results from information filtering. The third component (intention) is the behavioral intent generated by the cognition process. We used the information–cognition–intention model to consider the case of flash sales (the context), wherein, after reading either emotional or rational nWOM (the information), consumers

experience various types of emotions regarding nWOM that subsequently influence their nWOM cognitive and affective attitudes (cognition component). We also considered the perceived diagnosticity (cognition component) of nWOM and consumers' ultimate purchase intentions (intention component). Figure 1 illustrates the research model.

### 2.2 The context—flash sales

Initially developed as a means for retailers to rid themselves of excess inventory, flash sales are no longer restricted to this objective, with retailers now also using them to sell new and high-end products (Zhang et al. 2018). Flash sales offer numerous benefits to companies, such as enabling them to avoid excess inventory (Sodero and Rabinovich 2017) and attract new customers (Piccoli and Dev 2012). However, flash sales can be a double-edge sword (Peng et al. 2019). Some researchers have argued that flash sales constitute a myopic pricing strategy that alienates existing and new customers, resulting in premature stockouts, potential revenue losses (Sodero and Rabinovich 2017), and damaged brand integrity (Piccoli and Dev 2012).

Past studies have also provided conflicting results regarding flash sales customers. Flash sales increase consumers' perceived value (Eisend 2013), create excitement (Najjar 2011), and promote buying (Peng et al. 2019). However, there is doubt about whether creating short-term scarcity perceptions (Chen et al. 2021b) promotes or compromises sales (Peng et al. 2019). Although they create a sense of urgency, time limits can make consumers anxious and prompt negative purchase decisions (Dror et al. 1999). Some studies have suggested that flash sales attract price-sensitive consumers (Zhang et al. 2018). Vakeel et al. (2018) found that deal-prone consumers are prepared to engage in online flash sales despite unsatisfactory experiences and service failures during previous online flash sales. However, Berezina et al. (2016) found that hotel flash sales consumers were not necessarily more price conscious

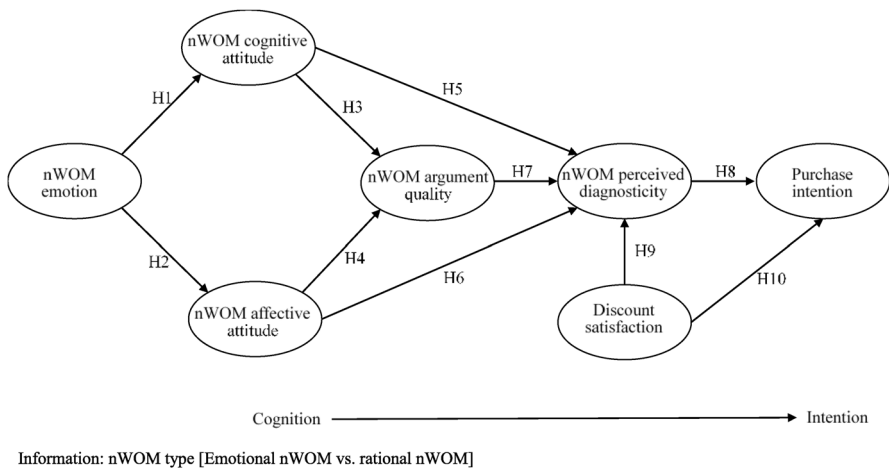


Fig. 1 Research model

than others but were likely to be quality-conscious “market mavens” and variety-seekers. Furthermore, claims that consumers make purchases impulsively under time pressure (Redine et al. 2023) have not been conclusively proven. For example, “flash-sale websites are less likely to attract impulse purchases. Rather, consumers who make more purchases exhibit higher levels of cautiousness” (Shi and Chen 2015, p. 931). Past studies have suggested that consumers look at other websites to compare prices (Sodero and Rabinovich 2017) or online recommendations (Godes and Mayzlin 2009) during flash sales.

Given the preceding theory, we considered a hypothetical flash sale scenario in which consumers seeking a Bluetooth headset browsed a well-known shopping website during the Double 11 Shopping Festival (where e-commerce sites offer large discounts and promotions on 11 November to boost their sales). Although the Bluetooth headset was offered at a 50% discount for same-day purchasing to catch their attention, they could also read nWOM about it. Thus, this scenario did not represent an unplanned purchase, and consumers were expected to be “calm” enough to read the nWOM about the Bluetooth headset. Consequently, in this study, we did not consider the impulse element.

### 2.3 nWOM

Because of its negative content, nWOM has a great influence on consumers' opinion formation and behavior (Craciun and Moore 2019). According to negative bias theory, “the psychological effects of negative information outweigh those of positive information” (Kim et al. 2020, p. 573). Thus, consumers pay more attention to and are more affected by negative than positively framed messages (Verma and Dewani 2021), thereby making nWOM more diagnostic than positive WOM (pWOM) (Bigne et al. 2023). nWOM also spreads faster than pWOM (Nam et al. 2020).

Therefore, nWOM often has devastating outcomes for the products and companies mentioned in the content (Nam et al. 2020) because nWOM results in consumers' poor opinion of the product (Doh and Hwang 2009) and lowers purchase or repurchase intentions (Nam et al. 2020). Despite these findings, some studies have suggested that nWOM does not always negatively impact companies. Berger et al. (2010) suggested that nWOM can increase product awareness, particularly regarding products manufactured by relatively unknown firms. The negative potency of nWOM is also context-sensitive. Negative brand information can be discounted by those who are already highly committed to the brand (Ahluwalia et al. 2000). Depending on the review intention, humorous nWOM can lead to either positive or negative responses (McGraw et al. 2015).

Hence, there is a need to understand the negative potency of nWOM in various contexts—in this study, the context of flash sales. Although nWOM deters consumers from buying products, flash sales push them in the opposite direction. Thus, we found it interesting to consider whether nWOM would continue to act as a brake on consumers' purchase intentions during flash sales and what influence (if any) nWOM would exert to counteract the sales promotion effect of flash sales.

To provide further insight into the influence of nWOM during flash sales, we considered diverse nWOM content. Researchers have used various labels to classify content, such as positive or negative valence (Septianto and Chiew 2018) or arousal, according to whether content is high or low in emotion (Septianto and Chiew 2018). Another classification is based on whether messages focus on the cognitive or emotional appeal of a product (Septianto and Pratiwi 2016). Kotler and Keller (2008) classified messages as rational if they presented product attributes, but as emotional if they elicited emotions. Similarly, Voss et al. (2003) distinguished between utilitarian electronic word-of-mouth (eWOM), which focuses on product functionality and effectiveness, and hedonic eWOM, which focuses on the emotional aspects of a product experience, such as pleasure. Subjective WOMs reflect the affective aspects of consumer's experience with opinions comprising personal feelings and judgments. They tend to be more emotional than objective WOMs, which reflect the cognitive aspects of consumer's experience with opinions which are based on facts and measurable observations (Bigne et al. 2021, 2023). A similar distinction was made by Park and Lee (2008) between attribute-value reviews (i.e., providing objective and rational product descriptions) and simple-recommendation reviews (i.e., providing emotional and subjective descriptions). Thus, the emotional content of word-of-mouth is often used to classify it, and in this study, following Wu and Wang (2011), we used an emotional nWOM (rich in emotional content) versus a rational nWOM (weak in emotional content) classification, basing the comparison on the hypotheses described hereafter.

## 2.4 Emotions regarding nWOM leading to nWOM cognitive and affective attitudes

Emotions arise from individuals' evaluations and mental construal of their environments (Li et al. 2022). According to the appraisal theory (Lazarus 1991), emotions affect how individuals evaluate, interpret, and explain an event or environmental stimulus (the appraisals). Thus, emotions play a significant role in information processing.

There are various ways to classify emotions. Mehrabian and Russell (1974) classified emotions according to pleasure, arousal, and dominance. Popular valence-based approaches consider both negative and positive emotions (Hong and Lee 2010). Although "most studies on emotions use a valence-based approach (i.e., positive versus negative emotions), earlier research has largely ignored whether specific emotions sharing a similar valence have different effects on behavior" (Herter et al. 2021, p. 148). Furthermore, research has revealed that specific emotions can generate different behavioral consequences (Septianto and Chiew 2018). Craciun and Moore (2019) suggested that distinct emotions generated by nWOM content drive negativity bias. Thus, we considered discrete emotions rather than broad emotion categories.

To avoid lengthy questionnaires that could lead to survey fatigue, we identified the most relevant specific emotions likely to be felt by consumers about nWOM after reading it during flash sales. Based on discussions with five Taiwanese

residents who had experienced nWOM and flash sales, the shortlisted emotions felt after reading the nWOM were optimism and gratitude among positive emotions, and worry and skepticism, among the negative. We excluded some common emotions, such as anger, shame, guilt, and sadness, because they were not relevant to the research context.

Some studies have viewed attitudes toward messages as single-dimensional construct (Le and Wang 2021), but others have used a “dual attitude” concept, whereby an attitude comprises cognitive and affective dimensions (Yoon et al. 2020). Cognitive attitudes refer to opinions and perceptions regarding a message, such as credibility and truthfulness (Yoon et al. 2020), whereas affective attitudes refer to feelings about a message, such as pleasure (Falcao and Isaias 2020). We considered both cognitive and affective attitudes because nWOM contains content that can simultaneously lead to both perceptions to varying degrees. The “dual attitude” model is also better than the single-dimension model in predicting behavior (Yang and Yoo 2004), and cognitive and affective perceptions are also important constructs in information processing models (Yoon et al. 2020).

We expected that consumers' emotions felt about the nWOM after reading it would affect their attitudes toward it. Emotions have a strong impact on consumer behavior (Chen and Lin 2018) and can shape attitudes (Chiu and Oh 2021). Some studies have shown that emotions can boost cognitive performance, depending on processing style and task nature (Huntsinger and Ray 2016). Cognitive attitudes are opinions and perceptions regarding a message, such as credibility and truthfulness (Yoon et al. 2020). Consumers often consider nWOM to be more credible and trustworthy than pWOM in helping them assess the quality of the concerned products and services. Affective attitudes refer to feelings about a message, such as its attractiveness (Falcao and Isaias 2020). Because emotions can also evoke affective responses (Main et al. 2004), we further expected that if consumers felt gratitude and optimism about nWOM content, they would probably deem the nWOM to be trustworthy (i.e., have more positive nWOM cognitive attitudes) and be impressed and attracted by it (i.e., have more positive nWOM affective attitudes). However, we anticipated that if consumers felt skepticism and worry about nWOM, they would probably have more negative nWOM cognitive and affective attitudes. Thus,

**H1a** The nWOM emotions of gratitude and optimism separately and positively influence nWOM cognitive attitudes.

**H1b** The nWOM emotions of skepticism and worry separately and negatively influence nWOM cognitive attitudes.

**H2a** The nWOM emotions of gratitude and optimism separately and positively influence nWOM affective attitudes.

**H2b** The nWOM emotions of skepticism and worry separately and negatively influence nWOM affective attitudes.

## 2.5 nWOM cognitive attitude, nWOM affective attitude, and perceived diagnosticity of nWOM leading to purchase intention

Argument quality refers to whether WOM content is convincing and persuasive (Luo et al. 2014). Yoon et al. (2020) showed that affective and cognitive perceptions contribute positively to persuasiveness. Thus, we expected that if readers held positive nWOM cognitive and affective attitudes, they would feel that nWOM possessed good argument quality. Thus,

**H3** nWOM cognitive attitudes positively influence nWOM argument quality.

**H4** nWOM affective attitudes positively influence nWOM argument quality.

According to information diagnosticity theory, “information is perceived as useful if it helps people reduce the uncertainty and ambiguousness involved in decision-making” (Kim et al. 2020, p. 574). Perceived diagnosticity is the degree to which consumers perceive WOM as helping them judge product quality (Wang and Chang 2013). Negative information is viewed as having greater diagnosticity and usefulness for decision-making than positive information (Guo et al. 2020; Kim et al. 2020). We anticipated that if readers felt they had positive cognitive attitudes, affective attitudes and argument quality toward nWOM, they would find the review useful. Thus,

**H5** nWOM cognitive attitudes positively influence the perceived diagnosticity of nWOM.

**H6** nWOM affective attitudes positively influence the perceived diagnosticity of nWOM.

**H7** nWOM argument quality positively influences the perceived diagnosticity of nWOM.

Studies have often illustrated that high diagnosticity helps customers avoid buying low-quality products (Pavlou et al. 2007) and is accompanied with confident purchase decision-making (Guo et al. 2020). According to prospect theory, individuals experience loss more intensely than pleasure (Kahneman and Tversky 1979). Hence, nWOM has a stronger influence on consumers’ purchase intentions than pWOM and deters consumers from buying a product. We expected that if nWOM acted as a brake on purchasing, consumers would not purchase a product after reading the nWOM (Guo et al. 2020). Thus, we postulated:

**H8** nWOM perceived diagnosticity negatively influences purchase intentions.



## 2.6 Impact of discount satisfaction on nWOM diagnosticity and purchase intentions

Discount satisfaction is the degree to which customers are pleased with the reduction they have during their purchasing (Wieseke et al. 2014). Studies on price promotion have often shown that price discounts lead to perceptions of money saving and purchase intentions (Hsieh and Lee 2022; Vakeel et al. 2018), and flash sales promote buying (Peng et al. 2019). Deal-prone consumers are more willing to disregard service failures and unsatisfactory experiences (Vakeel et al. 2018). Given the preceding information, and since we considered that nWOM would discourage purchasing, we expected that consumers who were happy with a discount would find nWOM less diagnostic and be prompted to purchase despite nWOM. Hence:

**H9** Discount satisfaction negatively influences nWOM perceived diagnosticity.

**H10** Discount satisfaction positively influences purchase intentions.

## 3 Research design

We first confirmed which emotional and rational nWOM should be used in the questionnaire, which was written in Chinese. To establish that the emotional and rational nWOM classification was appropriate, we designed four nWOM scenarios with varying degrees of affective and cognitive content, and then invited 13 individuals to rate the degree to which these four nWOM scenarios possessed affective and cognitive content on a 7-point Likert scale (1 = very cognitive to 7 = very affective). The nWOM with the highest mean score (mean = 6.08, standard deviation = 1.50) was used as the emotional nWOM, as follows:

[English translation] This Bluetooth headset is very hard to use. Its sound is really hollow, and there is absolutely no sense of layering. Every time I use it, I doubt what my ears are hearing. Moreover, a few times, the sound was simply inaudible when I listened to music. I don't know why this is happening. I'm using the headset in the usual manner! I initially thought the headset would allow me to listen to music conveniently and happily, but I never expected the quality to be so bad. It's really not worth the money. I think this headset should be locked up in a drawer to collect dust.

The nWOM with the lowest mean score (mean = 2.85, standard deviation = 1.21) was used as the rational nWOM, as follows, which we considered reasonable given that nWOM inevitably involves some venting of emotions.

[English translation] I don't think this Bluetooth headset is easy to use, and it is not of the expected quality. The sound is hollow and lacks layering. Sometimes, unexpectedly, it can become inaudible. I do not recommend that people buy it; the user experience is really bad.

The two sets of questionnaires (one for emotional nWOM and the other for rational nWOM) all started with following scenario description:

[English Translation] You really want to buy a Bluetooth headset, so you are browsing a well-known shopping website on November 11 during the Double 11 Shopping Festival. A Bluetooth headset is offered on the website with a short-term, major discount:

“Celebrate the Double 11 Shopping Festival! Get the NT\$3000 Bluetooth headphone for only NT\$1500. This 50% discount is available only today! The last day!”

While you are considering whether to pursue the offer, you search online for reviews regarding this Bluetooth headset posted by people who have bought it.

You see this review:

We chose a “50% off regular price” scenario because this discount level is often offered in flash sales (Berezina et al. 2016; Shi and Chen 2015). In the questionnaire, the introduction was followed by the relevant nWOM description (i.e., emotional nWOM for the emotional nWOM questionnaire, and rational nWOM for the rational nWOM questionnaire). Regardless of the type of nWOM, the questionnaire contained the same sets of items adopted by previous research, modified to fit the purpose of this study (Table 1).

We used a double translation (English–Chinese–English) protocol because the questionnaires were written in Chinese. We conducted a pretest with 10 people to identify questions that were inappropriately worded. The survey respondents expressed their degree of concurrence with the items on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Using convenience sampling, the research assistants personally approached suitable respondents at their places of work, residence, or education. The research assistants ascertained that the respondents met the inclusion criteria of Taiwanese residents with online shopping experience. If suitable, the candidates were randomly assigned to one of the self-administered questionnaires.

## 4 Results

We received 308 completed survey forms (150 for the emotional and 158 for the rational nWOM scenarios). Most respondents were young students (Table 2).

Recent studies have suggested using power analysis to confirm the minimum sample size needed (Hair et al. 2017; Uttley 2019). We computed the minimum sample size by considering the construct with the most predictors. An effect size of 0.15, a significance level of 0.05, and a power of 0.80 are recommended settings for business and social science research (Hair et al. 2017). Given that the nWOM cognitive attitude possessed the most predictors (i.e., 4), according to the G\*Power program, we required a minimum sample of 85 responses. Since we received 150 and 158 completed emotional and rational nWOM questionnaires, respectively, they exceeded the minimum required sample size.

**Table 1** Constructs

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<i>nWOM emotion (skepticism)</i> (Source: Holbrook and Batra 1988)
After reading the WOM, I felt:
– Skeptical
– Suspicious
<i>nWOM emotion (gratitude)</i> (Source: Holbrook and Batra 1988)
After reading the WOM, I felt:
– Grateful
– Thankful
– Appreciative
<i>nWOM emotion (worry)</i> (Source: Richins 1997)
After reading the WOM, I felt:
– Nervous
– Worried
<i>nWOM emotion (optimism)</i> (Source: Richins 1997)
After reading the WOM, I felt:
– Encouraged
– Hopeful
<i>nWOM cognitive attitude</i> (Source: Kilbourne 1986)
I felt that the WOM was
– Trustworthy
– Believable
<i>nWOM affective attitude</i> (Source: Kilbourne et al. 1985)
I felt that the WOM was
– Impressive
– Attractive
– Eye-catching
<i>nWOM argument quality</i> (Source: Luo et al. 2014)
I felt that the argument of this WOM was
– Convincing
– Strong
– Persuasive
<i>nWOM perceived diagnosticity</i> (Source: Wang and Chang 2013)
The WOM helps me:
– Evaluate the Bluetooth headset
– Judge the quality of the Bluetooth headset
– Assess the performance of the Bluetooth headset
<i>Discount satisfaction</i> (Source: Wieseke et al. 2014)
– I am satisfied with the discount I received
– I am satisfied with the concession I received
– I think I got the most out of the discount I received
<i>Purchase intention</i> (Source: Kim and Han 2014)
– I will consider purchasing the Bluetooth headset
– I intend to purchase the Bluetooth headset
– I will probably buy the Bluetooth headset

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We employed the partial least squares (PLS) method. The PLS method was used to validate the measurement model and to perform the path analysis because it is widely used in business and social science research (Sarstedt et al. 2022). The method also makes minimal requirements on measurement scales and sample size, and the data do not have to be normally distributed (Chin 1998).

**Table 2** Demographics profile ( $n = 308$ )

	Emotional nWOM ( $n = 150$ )		Rational nWOM ( $n = 158$ )	
	No	Percent	No	Percent
<b>Gender</b>				
Male	70	46.7	81	51.3
Female	80	53.3	77	48.7
<b>Age</b>				
18–20	52	34.7	46	29.1
21–25	69	46.0	91	57.6
26–30	20	13.3	10	6.3
31–40	8	5.3	10	6.4
41 and above	1	0.7	1	0.6
<b>Education</b>				
High school and below	10	6.7	8	5.1
Bachelor	120	80.0	132	83.5
Master and above	20	13.3	18	11.4
<b>Occupation</b>				
Student	114	76.0	126	79.7
Non-student	36	24.0	32	20.3

For both scenarios (Table 3), the constructs had good internal consistency and reliability, since the composite reliability (CR) values were above 0.7 (Chin 1998). Convergent validity existed because average variance extracted (AVE) values were greater than 0.5 (Chin 1998). Measurement items loaded more on their own latent construct than on other constructs. The constructs possessed discriminant validity

**Table 3** Descriptive statistics

	Emotional nWOM				Rational nWOM			
	Mean	S.D.	AVE	CR	Mean	S.D.	AVE	CR
<b>nWOM emotion</b>								
Gratitude	3.45	0.85	0.78	0.92	3.42	0.80	0.69	0.87
Skepticism	3.41	0.86	0.80	0.89	3.35	0.88	0.78	0.88
Worry	3.38	0.87	0.75	0.86	3.29	0.90	0.77	0.87
Optimism	2.36	0.79	0.78	0.87	2.27	0.80	0.73	0.84
<b>nWOM attitude</b>								
Cognitive	3.06	0.66	0.86	0.92	3.15	0.65	0.82	0.90
Affective	3.90	0.72	0.81	0.93	3.96	0.59	0.75	0.90
nWOM argument quality	3.26	0.70	0.74	0.90	3.35	0.62	0.68	0.86
nWOM perceived diagnosticity	3.83	0.71	0.77	0.91	3.87	0.76	0.84	0.94
Discount satisfaction	3.72	0.75	0.83	0.94	3.84	0.76	0.84	0.94
Purchase intention	2.44	0.84	0.82	0.93	2.53	0.88	0.83	0.94

because the square roots of AVE for all constructs were higher than the correlation coefficients of the constructs (Table 4), and the heterotrait–monotrait (HTMT) ratios were below 0.85 (Henseler et al. 2015). Multicollinearity was not a concern because the variance inflation factor (VIF) values were below 3. The models also had sufficient predictive relevance because the predictive relevance ( $Q^2$ ) values for all endogenous constructs were greater than zero (Hair et al. 2017). Harman's one-factor test revealed that the single factor for the emotional WOM scenario and rational WOM scenario accounted for 24.26% and 20.11% of the variance, respectively, which was below the threshold of 50% (Podsakoff et al. 1990). Thus, common method bias was not a concern.

Table 3 shows the descriptive statistics for the constructs. According to independent sample *t*-test, there was no significant difference in the mean for any of the constructs. Table 5 shows the path analysis result. For better clarity, the result is also shown as Fig. 2 (with only significant paths displayed).

We used the measurement invariance of composite models (MICOM) to confirm whether it was suitable to compare group-specific path-coefficients using PLS multigroup analysis (MGA) (Henseler et al. 2016). We confirmed the configural invariance because this study possessed the qualitative requirements of identical algorithm settings, identical data treatment, and identical indicators per measurement model (Henseler et al. 2016). We also confirmed the compositional invariance and equality of the means and variances, suggesting the existence of invariance (Table 6). Thus, the MICOM test confirmed that it was suitable to use PLS multigroup analysis.

Multigroup analysis based on the PLS-MGA method (Henseler et al. 2009) indicated significant differences in path coefficient values across the two scenarios for three paths (Table 5; Fig. 2): nWOM emotion (gratitude)→nWOM cognitive attitude (path coefficient: emotional nWOM=0.18; rational nWOM=0.39); nWOM emotion (gratitude)→nWOM affective attitude (path coefficient: emotional nWOM=0.48; rational nWOM=0.16); and nWOM perceived diagnosticity→purchase intention (path coefficient: emotional nWOM=-0.17; rational nWOM=-0.37).

## 5 Discussion

This research offers empirical support for the information–cognition–intention model (Wang and Chang 2013) and illustrates the model's usefulness as a framework for examining how nWOM influences purchase intentions during flash sales. As broadly predicated by the model, after receiving informational cues (nWOM), the various elements of cognition (nWOM emotions, cognitive attitude, affective attitude, argument quality, and perceived diagnosticity) affect the intention component (purchase intention). However, this study further revealed that the application and outcomes of the information–cognition–intention model must take into account for the context in which it is to be used. This study shows that how the various model components are linked depend on the nWOM content; for example, cognition (nWOM perceived diagnosticity) affected intention (purchase intention) for rational nWOM, but not for emotional nWOM.

**Table 4** Discriminant validity

	Emotional nWOM										Rational nWOM									
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
1-Discout satisfaction	<b>0.91</b>										<b>0.92</b>									
2-nWOM emotion (gratitude)	0.21	<b>0.89</b>									-0.02	<b>0.83</b>								
3-nWOM emotion (optimism)	0.12	0.43	<b>0.88</b>							0.03	0.14	<b>0.85</b>								
4-nWOM emotion (skepticism)	0.15	-0.08	-0.08	<b>0.90</b>						0.16	-0.03	0.05	<b>0.88</b>							
5-nWOM emotion (worry)	0.10	0.17	-0.08	0.24	<b>0.87</b>					0.09	0.06	-0.11	0.38	<b>0.88</b>						
6-nWOM affective attitude	0.22	0.46	0.11	0.14	0.25	<b>0.90</b>				0.21	0.15	0.01	0.22	0.14	<b>0.87</b>					
7-nWOM cognitive attitude	0.12	0.35	0.36	-0.20	0.16	0.31	<b>0.93</b>			-0.11	0.41	0.14	-0.23	-0.03	0.09	<b>0.91</b>				
8-nWOM argument quality	0.08	0.41	0.31	-0.02	0.33	0.42	0.65	<b>0.86</b>		-0.02	0.35	0.04	-0.04	0.08	0.38	0.63	<b>0.82</b>			
9-nWOM perceived diagnosticity	0.09	0.49	0.22	-0.04	0.32	0.48	0.38	0.56	<b>0.88</b>	-0.02	0.41	-0.03	-0.01	0.12	0.40	0.26	0.52	<b>0.92</b>		
10-Purchase intention	0.17	-0.16	0.28	-0.08	-0.23	-0.20	-0.07	-0.07	-0.16	<b>0.91</b>	0.29	-0.39	0.26	0.22	-0.11	-0.26	-0.21	-0.38	<b>0.91</b>	

Diagonal elements (bold) are square roots of AVEs. Off-diagonal elements are correlations between constructs

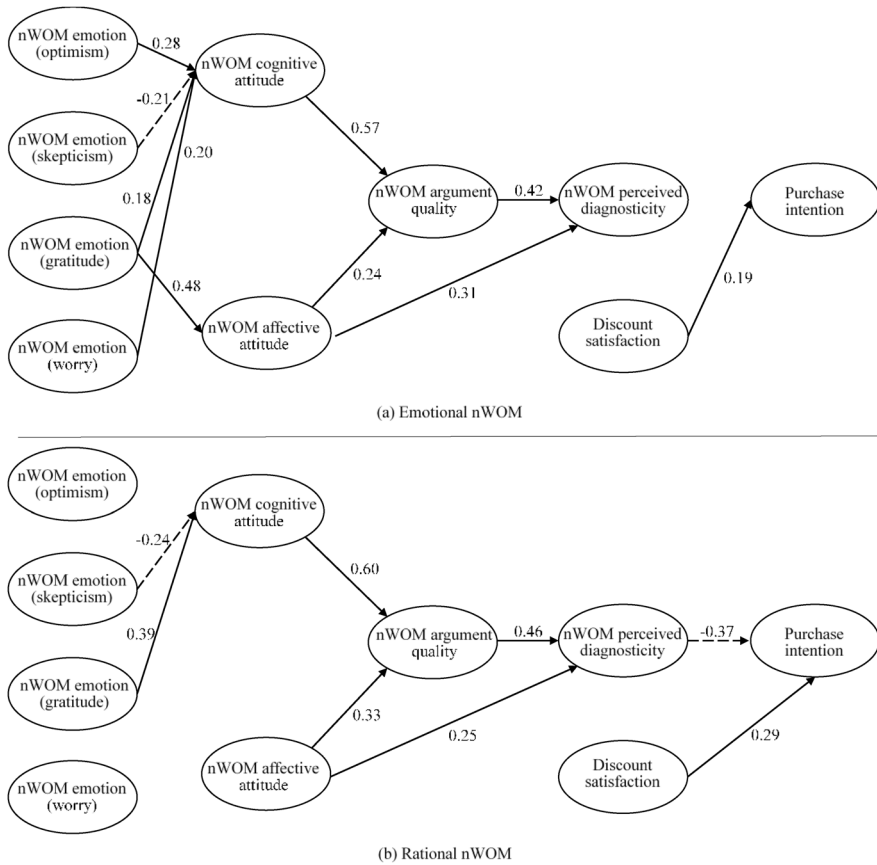
Table 5 Path analysis

	Emotional nWOM		Rational nWOM		
	Path-coefficient	t-value	Path-coefficient	t-value	
H1a	Optimism → nWOM cognitive attitude	0.28***	3.74	0.11	0.98
	Gratitude → nWOM cognitive attitude <sup>a</sup>	0.18*	2.00	0.39***	5.34
H1b	Skepticism → nWOM cognitive attitude	-0.21*	1.97	-0.24**	2.60
	Worry → nWOM cognitive attitude	0.20*	2.29	0.05	0.48
H2a	Optimism → nWOM affective attitude	-0.07	0.96	-0.01	0.12
	Gratitude → nWOM affective attitude <sup>a</sup>	0.48***	5.68	0.16	1.75
H2b	Skepticism → nWOM affective attitude	0.14	1.33	0.20	1.93
	Worry → nWOM affective attitude	0.13	1.50	0.06	0.60
H3	nWOM cognitive attitude → nWOM argument quality	0.57***	8.69	0.60***	12.52
H4	nWOM affective attitude → nWOM argument quality	0.24***	3.57	0.33***	4.69
H5	nWOM cognitive attitude → nWOM perceived diagnosticity	0.02	0.20	-0.06	0.67
H6	nWOM affective attitude → nWOM perceived diagnosticity	0.31***	4.18	0.25**	2.87
H7	nWOM argument quality → nWOM perceived diagnosticity	0.42***	4.46	0.46***	4.49
H8	nWOM perceived diagnosticity → Purchase intention <sup>a</sup>	-0.17	1.76	-0.37***	4.91
H9	Discount satisfaction → nWOM perceived diagnosticity	-0.02	0.22	-0.07	0.85
H10	Discount satisfaction → Purchase intention	0.19*	2.31	0.29***	3.98

Emotional nWOM:  $R^2$  of nWOM cognitive attitude = 0.23; nWOM affective attitude = 0.26; nWOM argument quality = 0.47; nWOM perceived diagnosticity = 0.39; purchase intention = 0.06. Rational nWOM:  $R^2$  of nWOM cognitive attitude = 0.23; nWOM affective attitude = 0.07; nWOM argument quality = 0.50; nWOM perceived diagnosticity = 0.32; purchase intention = 0.23

\* Significant at  $p < 0.05$ , \*\* significant at  $p < 0.01$ , \*\*\* significant at  $p < 0.001$

<sup>a</sup> According to multigroup analysis, path-coefficients are significantly different for three paths: nWOM emotion (gratitude) → nWOM cognitive attitude, nWOM emotion (gratitude) → nWOM affective attitude; and nWOM perceived diagnosticity → purchase intention



Note:

1. Only significant paths are displayed (solid line: positive path coefficient, dotted line: negative path coefficient)
2. According to multi-group analysis, significant difference in path coefficients occur for paths: (1) nWOM emotion (gratitude)→nWOM cognitive attitude, (2) nWOM emotion (gratitude)→nWOM affective attitude, and (3) nWOM perceived diagnosticity→purchase intention

Fig. 2 Path analysis results

This paper further contributes to the nWOM literature by considering how the emotions generated by nWOM affect perceptions of nWOM and the subsequent ability of nWOM to affect purchase intentions in several ways. First, the analysis revealed that despite having different valences (worry and skepticism being negative emotions, and gratitude and optimism being positive emotions), these emotions were felt by the consumers about the nWOM (regardless of content type) after viewing it, with gratitude and optimism being the most and least felt emotions, respectively. Thus, this study supports the notion that individuals can experience emotions with opposite valences simultaneously after viewing nWOM (Cacioppo et al. 1999).



Table 6 MICOM analysis

	Compositional invariance (CI) assessment			Equal mean assessment			Equal-variance assessment		
	Correlation of empirical distribution of $c_{it}$	$p$ value	CI established?	Difference of composite's mean value (=0)	95% confidence interval	Equal mean?	Logarithm of composite's variances ratio (=0)	95% confidence interval	Equal variance?
Discontent satisfaction	0.999	0.782	Yes	-0.154	[-0.225;0.218]	Yes	-0.050	[-0.384;0.355]	Yes
nWOM emotion (gratitude)	0.998	0.485	Yes	0.041	[-0.235;0.231]	Yes	0.119	[-0.336;0.319]	Yes
nWOM emotion (optimism)	0.988	0.508	Yes	0.119	[-0.236;0.223]	Yes	0.007	[-0.256;0.243]	Yes
nWOM emotion (skepticism)	0.999	0.836	Yes	0.058	[-0.231;0.234]	Yes	-0.034	[-0.322;0.312]	Yes
nWOM emotion (worry)	0.999	0.910	Yes	0.095	[-0.224;0.217]	Yes	-0.049	[-0.331;0.299]	Yes
nWOM affective attitude	0.997	0.142	Yes	-0.082	[-0.220;0.206]	Yes	0.419	[-0.464;0.495]	Yes
nWOM cognitive attitude	1.000	0.246	Yes	-0.136	[-0.217;0.232]	Yes	0.024	[-0.391;0.414]	Yes
nWOM argument quality	1.000	0.832	Yes	-0.131	[-0.222;0.237]	Yes	0.239	[-0.351;0.346]	Yes

Table 6 (continued)

	Compositional invariance (CI) assessment			Equal mean assessment			Equal-variance assessment		
	Correlation of empirical distribution of $c_{it}$	$p$ value	CI established?	Difference of composite's mean value (=0)	95% confidence interval	Equal mean?	Logarithm of composite's variances ratio (=0)	95% confidence interval	Equal variance?
nWOM perceived diagnosticity	1.000	0.544	Yes	-0.060	[-0.218;0.234]	Yes	-0.114	[-0.388;0.366]	Yes
Purchase intention	0.999	0.540	Yes	-0.102	[-0.231;0.219]	Yes	-0.084	[-0.349;0.333]	Yes

Second, by considering emotions at the discrete level (optimism, skepticism, gratitude, and worry), rather than in terms of the popular valence-based (positive/negative) emotion taxonomy, this study shows that specific emotions with similar valences can have different effects on behavior (Herter et al. 2021). For example, although worry and skepticism are negative emotions, their impact on nWOM attitudes differed significantly. Skepticism had a negative effect on nWOM cognitive attitudes, whereas worry had a positive effect for emotional nWOM. This finding supports the argument that skepticism inhibits cognitive processing (Bae 2020) and further supports studies such as Septianto and Chiew's (2018) study, which recommended that researchers examine the effect of discrete emotions, rather than broad categories, to obtain useful insights.

Third, the analysis also revealed that, regardless of the nWOM content, gratitude was the most strongly felt emotion. Furthermore, its impact on attitudes toward nWOM was more prevalent than for other emotions. When experiencing flash sales offering short-term discounts, consumers are torn between benefiting from the discount by purchasing the product or forgoing the discount. At this juncture, nWOM based on usage experience can help users decide; hence, gratitude is generated and affects their nWOM attitudes.

Fourth, the emotional impact of nWOM on attitudes depends on whether the information cue is emotional or rational. Although the level of gratitude is the same, regardless of the nWOM content, there are critical differences in the consequences of gratitude in terms of nWOM attitudes arising from nWOM content. For the emotional nWOM scenario, gratitude contributed positively to cognitive and affective nWOM attitudes, with its influence on affective attitude (path coefficient=0.48) being stronger than on a cognitive attitude (path coefficient=0.18). For the rational nWOM scenario, the impact of gratitude was more restrained, and it only positively influenced nWOM cognitive attitude. That the impact of gratitude was most significant for nWOM affective attitude when the nWOM was emotional and for nWOM cognitive attitude when nWOM was cognitive was further confirmed by the PLS-MGA analysis, which revealed significant differences in the path coefficient values for two paths: nWOM emotion (gratitude) → nWOM cognitive attitude (path coefficient: rational nWOM=0.39; emotional nWOM=0.18) and nWOM emotion (gratitude) → nWOM affective attitude (path coefficient: emotional nWOM=0.48; rational nWOM=0.16).

Fifth, the study revealed that the consequences of other discrete emotions were more limited than those of gratitude. Although gratitude could affect both types of nWOM attitudes, the other emotions could only affect nWOM cognitive attitude depending on whether the nWOM was considered believable and trustworthy. For the emotional nWOM scenario, all these emotions influenced nWOM cognitive attitude: optimism and worry affected it positively, whereas skepticism affected it negatively. However, after viewing rational nWOM, only skepticism negatively influenced nWOM cognitive attitude. Hence, this study shows that given the same level of emotion invoked by viewing nWOM, whether a particular emotion is influential depends on the nWOM content.

This study also adds to the literature of the less frequently studied nWOM perceived diagnosticity in three ways. First, unlike studies such as that conducted by

Kim and Gupta (2012), which found that consumers consider nWOM with negative emotional content less rational and less helpful, this study found the same level of perceived diagnosticity for emotional and rational nWOM scenarios.

Second, only affective nWOM attitudes directly and positively influenced nWOM perceived diagnosticity. This study suggests that the atmosphere associated with flash sales (i.e., anxiety and the need to make spontaneous decisions due to the temptation of time-limited discounts) (Berezina et al. 2016; Liu et al. 2021; Shi and Chen 2015; Vakeel et al. 2018) results in consumers believing that nWOM is helpful if it is impressive and eye-catching. However, the more thoughtful process of determining whether nWOM is trustworthy (cognitive attitude) requires consumers to be further convinced that the nWOM argument is strong and persuasive before they find nWOM helpful. Thus, the emotional and affective aspects, rather than the cognitive aspects, have direct implications for perceived nWOM diagnosticity due to the charged atmosphere of an attractive discount and time pressure occurring simultaneously.

Third, this study provides evidence that the consequences of information diagnosticity are context-sensitive, which is related to this study's main objective, i.e., to investigate whether nWOM, despite its renowned strongly negative effect on purchase intentions (Shin and Larson 2020), fails to act as a brake on purchase intentions. This study shows that, for flash sales, the effect of nWOM, once perceived as diagnostic, depends on its content. If the content is mostly rational, nWOM, once perceived as diagnostic, decreases purchase intentions. However, if the content is mostly emotional, nWOM has no effect on purchase intentions, regardless of how consumers view its diagnosticity. Hence, nWOM can sometimes fail to act as a brake on purchase intentions, and its content is a deciding factor.

This study offers several practical implications for flash sales operators and people who want to write impactful nWOM. Although discount satisfaction prompts purchase intentions (Peng et al. 2019; Vakeel et al. 2018), it does not undermine perceived nWOM diagnosticity. Thus, although nWOM is moderately useful in helping consumers judge product quality during flash sales (mean of nWOM for perceived diagnosticity: emotional nWOM = 3.83; rational nWOM = 3.87), flash sales operators should not underestimate the destructive potential of nWOM and assume that a time limit coupled with an attractive discount is a silver bullet for peddling products despite negative feedback from previous users. Additionally, rational rather than emotional nWOM is more damaging to sales. Although it is difficult for operators to control what nWOM is generated, they should identify products that attract minimal nWOM. If, for some reason, they have to offer products with significant nWOM (for example, to reduce slow-moving product inventory), they should identify products with more emotional nWOM content than rational content to reduce the probability of consumers considering rational nWOM content. Of course, operators could introduce mechanisms (such as “discount will be dropped by a further X% if you decide within the next 1 min”) to hasten consumers' decision-making and deter them from checking nWOM. Those wanting to write influential nWOM content will find that nWOM with more rational than emotional content is appropriate. Authors of nWOM will have to find ways to be rational while voicing their frustrations.

Although it provides interesting insights, this study has several limitations. We used a convenience sampling method, which limits the generalization of the results. We also considered flash sales to be not totally unplanned purchases. Future studies could consider totally unplanned purchases and how impulse buying contributes to nWOM assessments. This study only considered nWOM and four discrete emotions to avoid survey fatigue; hence, future studies should consider including other types of WOM and emotions.

## Declarations

**Conflict of interest** There is no conflict of interest to declare.

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